Information Revolution in Military Affairs:
Prospects for Asia[1]

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Diffusion and the Revolution in Military Affairs

Defense planners in the United States have been captured by the notion of a revolution in military affairs, planning for the military after next, by leaping ahead to embrace emerging technologies and create a transformation in how militaries go about their business. As the current RMA unfolds, US strategists must pay equal attention to its internal and external dynamics. Internally, the US military is working to develop the doctrine and organizational structures to affectively integrate and exploit emerging technologies. Externally, the US must be able to respond to other states that we should assume are attempting to leverage the RMA for their own purposes. Much of the vast RMA literature focuses on the internal dimension—the new technologies, organization, and doctrine required for transforming the US military. Less, though an increasing amount of attention has been devoted to the external dimension—how the innovations currently being leveraged most effectively by the United States are being adopted and adapted elsewhere.

A new study that explicitly addresses the diffusion of military technologies, doctrines, organizational forms, and practices reached some disconcerting conclusions about the impact of diffusion on military preeminence.[2] First, transformation leaders do not long monopolize "their" transformations. Second, leaders are frequently surpassed by followers and the advantage often goes to followers. Third, leadership in effecting a military transformation is no guarantee of victory. Fourth, the roots of military transformations are typically nonmilitary, which means military revolutions are nearly impossible to steer and control. Finally, wholesale replication of the innovations of a transformation may be unnecessary. Limited, selective emulation and adaptation can be sufficient to shift the balance of power and influence. More than any previous generation, US military leaders today are much more aware that they are in the midst of an unfolding RMA. Even as they try to prod the process along within the United States armed forces in the hopes of prolonging American military preeminence, they must attend to the RMA's diffusion abroad for dynamics outside of the US will determine the future of the current RMA as much as, if not more than, developments inside the US.

If we start from the assumption that the processes at work in the diffusion of past RMAs will be present in the current RMA, though the exact manner in which the current RMA unfolds will have unique attributes, than we must have a strategy for the external

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[1] John Kennedy, Satoshi Shimada and Leo Blanken provided valuable research assistance for this project.
[2] See Emily O. Goldman and Andrew L. Ross, "The Diffusion of Military Knowledge: Theory and Practice," in Emily O. Goldman and Leslie C. Eliason, *The Diffusion of Military Technology and Ideas* (Stanford University Press, forthcoming 2003).

dimension of the RMA. This requires understanding the behavior and capabilities of others countries, both adversaries and allies, and how likely they will be to exploit the current RMA. This study builds upon theoretical and historical insights about military diffusion to advance our knowledge of how the current RMA is unfolding in the Asia-Pacific region. We use the terms "innovation" and "transformation" interchangeably to refer to radical changes in organizational structure, resource allocation, doctrine and strategy. Military organizations are comparative institutions that closely monitor one another and assess their capabilities vis-à-vis each other, particularly during periods of transformation like the industrial revolution and the information revolution. So diffusion and innovation are inextricably linked. New technologies and ideas spread from the settings in which they were originally conceived and developed, yet at the same time, militaries grapple with the application to their particular setting, which may involve unique adaptations and innovations. The contributors to this project were asked to address both facets – the diffusion of new war fighting approaches to their militaries from abroad and the unique process of transformation occurring within the national military establishment they were examining.

The empirical chapters trace how China, Japan, Taiwan, Singapore, and Australia are absorbing new technologies and operational concepts and adapting indigenous institutions to leverage the information RMA. These five states are among those identified by scholars as having the greatest capacity to exploit the emerging RMA. Dibb has argued that Australia and Japan have a high capacity to absorb the RMA, while China, Singapore, and Taiwan have a moderate capability.[3] Roessner and Salamone have argued that both Singapore and Taiwan have exhibited long-term commitment to the expansion of their high-technology capacity.[4] Only by tracking how the RMA is diffusing will we be able to make informed assessments about the implications of the RMA for regional relationships and US national security.

This introduction provides an overview of the research questions guiding the study. It reviews two different yet compatible approaches to understanding the military diffusion process. It next provides a review of the theoretical and empirical literature on military diffusion and transformation and summarizes what we know about the drivers, enablers and inhibitors of diffusion. Since much of the attention has been on China, the review includes some discussions of empirical research on China with an eye toward comparing what we know from historical research on military diffusion with what analysts have concluded from the contemporary record. This chapter concludes with a summary of the key RMA enablers/barriers that will be critical factors in shaping how rapidly and deeply transformation is likely to proceed across the Asia-Pacific region.

Study Overview

The process guiding our analysis of the approaches of China, Japan, Taiwan, Singapore, and Australia to the IT-RMA is based on the logic of structured, focused, comparative

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[3] Paul Dibb, "The Revolution in Military Affairs and Asian Security," *Survival* 39, no. 4 (Winter 1997-98).

[4] David Roessner and Michael Salamone, "National Technological Competitiveness and the Revolution in Military Affairs," final report, phase II, prepared for the Director, Office of Net Assessment, Office of the Secretary of Defense, June 1, 1999. Notably, Roessner and Salamone did not include Australia and Japan in their study.

case study analysis.[5] The approach requires that a set of cases be examined based on a common set of study questions. Although the cases selected are not a representative sample of all militaries that are adapting to the current RMA, they are all countries of interest to the United States and their military decisions will have a significant impact on security in the Asia-Pacific region. These cases should be of intrinsic interest to the policy community. They also display variation along several dimensions, which makes them theoretically interesting: their relationship to the United States (from close ally to potential adversary); their motivations to adopt RMA innovations (from interoperability with the US to countering US capabilities); and the factors that affect their capacity to integrate RMA innovations. Accordingly, these are a useful set of cases for mapping out RMA trajectories.

The research design is based on the methodology of "diffusion diagnostics," which has four key components: (1) identifying the incentives or motives to adopt new practices; (2) identifying the models that are likely to be targets of adoption or off-sets; (3) identifying the ease with which military technology and ideas are likely to be absorbed in different environments; and (4) capturing the results of military diffusion within states and organizations in order to understand indigenous patterns and the range of possible adaptations[6]. Based on these four diagnostic tasks, a set of overarching research questions were developed:

1. What are the state's motives for importing and adopting new technologies, ideas, and practices associated with the IT-RMA?
2. What military model or models (regional or global) is the state attempting to emulate, adapt, or offset?
3. What is the process of transnational communication and influence by which innovations are disseminated?
4. What factors enable and constrain the spread of military knowledge?
5. What factors hinder retention of the new idea by the receiving state and/or organization?
6. How is the adopting state incorporating the innovations into its organizations and practices—partial or selective emulation, adaptation, offset, or innovation?

From these research questions, more specific questions were crafted to guide the writing of the cases:

1. How does the national security establishment in your country define the current RMA? How do the individual services define it?
2. How applicable is the RMA to the country's security situation? In what ways?
3. What is the level of interest in the RMA?
4. Is the information technology revolution perceived to affect civil society? In what ways? (e.g., computer literacy and its relevance for military manpower)
5. Who are defense officials communicating with in other countries about RMA issues?

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[5] Alexander L. "Case Studies and Theory Development: The Method of Structured, Focused Comparison." In Paul Gordon Lauren, ed. *Diplomacy: New Approaches in History, Theory, and Policy* (New York: Free Press, 1979): 43-68.
[6] This methodology is proposed in Goldman and Eliason, eds., op. cit.

6. Is any particular military or set of militaries being held up as a model to be emulated? If relevant, whose concepts are you using or adapting?

7. How much are developments within the US influencing modernization efforts in your country?

8. Describe any organizational and doctrinal changes occurring, and if possible discuss with reference to the following indicators:

- Publication of concept papers, books, journal articles, speeches, and studies regarding new combat methods.
- Formation of groups to study the lessons of recent wars.
- Interest in foreign innovation activities.
- Existence of an organization charged with innovation and experimentation.
- Establishment of experimental organizations and testing grounds.
- Field training exercises to explore new warfare concepts.
- War gaming by war colleges, the defense industry, and think tanks regarding new warfare areas.
- Experimentation with new combat methods in wartime.
- Existence of a formal transformation strategy.
- Establishment of new units to exploit, counter innovative mission areas.
- Revision of doctrine to include new missions.
- Establishment of new branches, career paths.
- Changes in the curriculum of professional military education institutions.
- Field training exercises to practice and refine concepts.

9. What variation is there among the different services in progress on the RMA?

10. What obstacles do RMA advocates within your country face?

11. What is your estimation of the progress and intentions of others in the region in adopting the RMA?

Experts analyze the cases based on this common set of questions and concepts. Common concepts and questions informed by policy relevant concerns ensure that the papers relate to one another. They increase the chances that the conclusions drawn from bringing together various experts and their research advance cumulative knowledge, and that we will produce findings that help bridge the gap between academic research and the needs of the community of policy practitioners.

Diffusion Literature Overview

Diffusion Stages

Diffusion is a process that unfolds over time. It is reasonable to assume that the dynamics of each stage will impact the ultimate outcome; hence the need to examine each stage of the process. Scholars have characterized that process differently.

Goldman conceptualizes diffusion as a three-stage process.[7] In the transmission stage, new hardware or software is acquired from abroad or developed indigenously. In the

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[7] Emily O. Goldman, "New Ways of War: Norm Diffusion and Military Transformation," manuscript.

adoption stage, elite consensus forms around a path of reform. The process is likely to be a highly contested one but it should be possible to determine how committed reformers are to absorbing new technologies and practices. Adoption spans a continuum from maintaining current practices to adopting a new approach in its entirety. In the assimilation stage, new ideas are integrated into existing institutions and practices. Goldman argues that tracking and assessing variation in the scope and extent of transformation requires analysis of all three phases. Breaking down diffusion into these stages is a necessary analytical tool, even though in reality the stages may not be temporally sequential. Transmission is a continuous process that overlaps with adoption and assimilation. Adoption and assimilation may proceed in fits and starts.

Mahnken assesses the extent of transformation within military organizations based on a set of indicators that capture how far a military has moved down the path of transformation (see Table 1).[8]

Table 1: Potential Indicators of Transformation

Phase	Potential Indicators of Transformation
I. Speculation	- Publication of concept papers, books, journal articles, speeches, and studies regarding new combat methods. - Formation of groups to study the lessons of recent wars. - Establishment of intelligence collection requirements focused upon foreign innovation activities.
II. Experimentation	- Existence of an organization charged with innovation and experimentation. - Establishment of experimental organizations and testing grounds. - Field training exercises to explore new warfare concepts. - War gaming by war colleges, the defense industry, and think tanks regarding new warfare areas. - Experimentation with new combat methods in wartime.
III. Implementation	- Existence of a formal transformation strategy. - Establishment of new units to exploit, counter innovative mission areas. - Revision of doctrine to include new missions. - Establishment of new branches, career paths. - Changes in the curriculum of professional military education institutions. - Field training exercises to practice, refine concepts.

Mahnken proposes three phases: speculation, experimentation, and implementation. By juxtaposing Mahnken's and Goldman's schemas (see Table 2), we see that speculation

[8] Thomas G. Mahnken, "Uncovering Foreign Military Innovation," *Journal of Strategic Studies* 22:4 (December 1999).

overlaps with transmission. Speculation is often fueled by information about ideas and practices from abroad. The country studies document how US writings on the revolution in military affairs have infiltrated discussions of transformation throughout the Asia Pacific region. Experimentation usually occurs when elites are debating the adoption of new methods. Based in part upon assessments of experiments, decisions about whether or not to adopt some variant of the innovations in question are made. Implementation overlaps with assimilation. Mahnken's phase of implementation focus on the military while Goldman's stage of assimilation also includes changes in society at large that might be required for transformation to take hold firmly within the military.

Table 2: Schemas for Analyzing the Diffusion Process

Goldman's stages	Mahnken's phases
Transmission	Speculation
Adoption	Experimentation
Assimilation	Implementation

Most of the early work on diffusion focused on the transmission of ideas, or access to information, not on how particular ideas produce policy change through adoption, experimentation, implementation and assimilation. But diffusion and transmission are not synonymous because a host of factors can derail diffusion during the adoption and assimilation stages. Technological innovations have been rejected, for example, "not through ignorance, but through incompatibility with the existing cultural system as a whole."[9] Policymakers have rejected out of hand programs that were normatively unacceptable to their citizens' despite the effectiveness of the program elsewhere.[10] Culture consistently appears as a dominant factor shaping the scope and pace of diffusion and transformation. Local cultural models or norms specific to an organization often pose barriers to diffusion.[11] In fact, cross-cultural transfer is rarely complete whether due to imperfect information, the influence of alternative implicit models based on past experience, conflict between the imported model and valued local patterns, a different societal scale (e.g., population or geographic area) between the receiving society and the society in which the model originally developed, or absence of some of the organizations (e.g., schools, industry) that supported the model in its original setting.[12]

In the adoption stage, competition is usually assumed to be a major driver of military diffusion. Because competition is pervasive in the international system, states have a powerful incentive to adopt innovative military methods, particularly those of the most

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[9] James M. Blaut, "Two Views of Diffusion," *Annals of the Association of American Geographers* 67,3 (Sept 1997):343.

[10] David Brian Robertson, "Political Conflict and Lesson-Drawing," *Journal of Public Policy* 11,1 (Jan-Mar 1991): 68.

[11] Theo Farrell, "Culture and Military Power." *Review of International Studies* 24 (1998); Craig M. Cameron, *American Samurai: Myth, Imagination, and the Conduct of Battle in the First Marine Division, 1941-1951* (Cambridge University Press, 1994); Jeffrey W. Legro, *Cooperation Under Fire: Anglo-German Restraint During World War II* (Cornell University Press, 1995); Peter J. Katzenstein, *Cultural Norms and National Security: Police and Military in Japan* (Cornell University Press, 1996); Elizabeth Kier, *Imagining War: French and British Doctrine Between the Wars* (Princeton University Press, 1997).

[12] D. Eleanor Westney, *Imitation and Innovation: The Transfer of Western Organizational Patterns to Meiji Japan* (Cambridge: Harvard University Press, 1987).

successful states in the system.[13]   Factor endowments, geography, learning contexts, strategic circumstances and the nature of threats will influence which practices states desire to adopt but given mission requirements, efficiency is assumed to drive model selection. For example, continental powers may decide it is unnecessary or unaffordable to attempt the sea control mission, but will adopt the most successful practices for coast defense.

Although military organizations have a rational interest in adopting the most effective methods to secure the state, they are as likely to be driven by the goal of bureaucratic survival. If an innovation poses a major threat to the organization's missions, resources, autonomy, or essence, it may be strongly resisted; innovations that pose no such threats are far more likely to be adopted.[14] Evidence has also been marshaled to demonstrate that technologies, forms and practices may be widely adopted simply because they reflect the institutionalized cultural values of the world polity.[15] In other words, institutional pressures stimulate the spread of forms and practices across organizations in the same profession. Normative pressures operate through educational and professional networks via a process of socialization.   The more professionalized a field, the greater the convergence in organizational form across the members as they come to share understandings of appropriate behavior and identity. While the prestige a particular practice has abroad may differ from its legitimacy within the adopting society, the fact that a form or practice is sanctioned abroad increases the likelihood that it will become a model for emulation. International norms have exerted a powerful influence on national military organizations.[16] Paradoxically, no compelling strategic necessity may be required for transformation.

The most under-studied aspects of the diffusion process are the assimilation and implementation phases which hinge on the capacity to transform. We discuss the factors that affect assimilation and implementation below in the section on "Diffusion Enablers and Inhibitors."

Diffusion Drivers

The first step in understanding specific state responses to the emergence of new technologies or new ways of combining existing and new technologies in innovative ways to produce a new way of war is to identify the motivations or drivers of diffusion. Presumably different military models will be appealing to a state based on the motivation at work.   The extant literature posits four types of explanations: security; political economy; technology; and institutional.[17]

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[13] Kenneth N. Waltz, *Theory of International Politics* (Reading, MA: Addison-Wesley, 1979).
[14] Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca: Cornell University Press, 1984).
[15] Farrell 2001; Demchak manuscript; Dana P. Eyre and Mark C. Suchman, "Status, Norms, and the Proliferation of Conventional Weapons: An Institutional Theory Approach," in Peter J. Katzenstein, ed., *The Culture of National Security: Norms and Identity in World Politics* (New York: Columbia University Press, 1996):79-113.
[16] See Theo Farrell, "World Culture and Military Change in Post-Revolutionary Ireland," in Farrell and Terriff, eds., forthcoming; Theo Farrell, "World Culture and Military Development," July 1999, draft manuscript; Chris Demchak, "Creating the Enemy: Global Diffusion of the IT-Based Military Model," in Goldman and Eliason, ed., op cit.; Eyre and Suchman, op. cit..
[17] Demchak ibid.

Security explanations argue the competitive logic governing the international system creates a powerful incentive for actors to adopt the military practices of the most successful actors in the system. Actors, like firms, emulate out of fear of the disadvantages that arise from being less competitively organized and equipped. Military historians concur that competition is a powerful factor in the spread of military innovations. "More than any other institution, militaries tend to copy one another across state borders, and with good reason. War is a matter of Darwinian dominance or survival for states, and of life or death for individuals. When an army confronts new or different weaponry or practices on the battlefield, it must adapt to them, and often adaptation takes the form of imitation."[18] It should be noted, however, that full emulation may not be the most efficient way to provide security given particular factor endowments or geography. In several of the countries examined here, demographic pressures help to define which practices are most efficient.

Two other security-related explanations are spheres of influence and alliance obligations. If a nation is in a sphere of influence, or likely to obtain benefits by positioning itself in a bloc, it is expected to emulate the practices of the bloc leader as a political statement of solidarity. If a nation is a member of a military alliance, it will pursue the modernization plans imposed by the alliance. This may involve emulation to facilitate interoperability or specialization to facilitate complementarity. Policy analysts tend to focus on diffusion among competitors as the greatest concern, but collaborative or voluntary processes also affect the international balance of power.

Political-economy explanations focus on the economic pressures on actors to adopt new military practices. Economic pressures emanate from interested actors in the military-industrial complex, national defense community, or commercial sector. Today, diffusion occurs via commercial as well as military and political channels. Globalization has transformed the American defense industrial and informational base into a global one. Innovations originate from science, academia, the military, and industry. Innovations also feature multiple applications, civilian and military. Accordingly, military diffusion is not simply a state-to-state process, controlled and managed by central political decision-makers in the service of the national interest. Firms, organizations, educational institutions, and individuals all play important roles in the transmission of new knowledge and applications.

Technology explanations are related to political-economy explanations but focus specifically on characteristics of the innovation that encourage or discourage its adoption. The key technologies underlying the current revolution in military affairs are driven by the civilian commercial economy. There is tremendous commercial pressure for them to spread because they provide a competitive advantage in the global economy. One implication is that diffusion of information technology hardware will be rapid and widespread. Though the commercial or dual-use applications of a technology may

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[18] John A. Lynn, "The Evolution of Army Style in the Modern West, 800-2000," *The International History Review* 18:3 (August 1996):509.

encourage its adoption, lack of capital investment, supporting infrastructure, or skill sets needed may impede diffusion.

Institutional explanations of two types are relevant here. Bureaucratic interpretations of military behavior focus on inter- and intra-organizational competition and infighting. New practices are adopted if they enhance the organization's resources, autonomy, and essence. Offensive technologies and doctrines are hypothesized to give the organization greater control and resources.[19] Adaptations often result from bureaucratic infighting or existing organizational preferences that are grounded in prior experience and tradition. Bureaucratic approaches predict incremental change due to organizational inertia.

Neo-institutional approaches (so-called because institutions are defined as norms) focus on non-competitive pressures that motivate members of a profession to emulate one another across borders. Organizations strive for institutional legitimacy. Through professional networks, organizations share ideas about the best organizational structures and the most legitimate way to practice their profession. Neo-institutionalist assumptions predict that US models should be preeminent targets of emulation today, just as Prussia was considered a "paradigm" military in the past.[20] However, there may also be alternative models within a state's region or cultural affinity group. Domestic policy studies have shown that states tend to copy or adapt policies similar to those of states with which the leadership identifies. Thus "southern" states may be more likely to adopt policies that have taken hold in other southern states than they are to adopt policies in perhaps geographically closer "northern" states or "border" states.[21] International policy studies have shown that in the economic sphere, the Japanese or "Asian" model of economic development was far more attractive to regional actors than the "Anglo-Saxon" model.

The motivation at work will define the diffusion trajectory or the transformation path pursued by the state. However, a variety of forces can intervene to affect the ability of the state to reach the trajectory's endpoint. In the end, the diffusion driver will be one influence, albeit a very important one, on the state's transformation path. Correctly assessing this influence is the first step in the methodology of diffusion diagnostics. It tells us the endpoint to which state leaders aspire. Diffusion drivers and influences are presented in Table 3.

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[19] Posen, op. cit.

[20] Lynn, op. cit.

[21] Jack L. Walker, "Comment: Problems in Research on the Diffusion of Policy Innovations," *American Political Science Review* 67, 4 (December 1973): 1186-1191; Jack L. Walker, "The Diffusion of Innovations Among the American States," *American Political Science Review* 63, 3 (September 1969): 880-899; Virginia Gray, "Innovation in the States: A Diffusion Study," *American Political Science Review* 67, 4 (December 1973): 1174-1185; Virginia Gray, "Rejoinder to 'Comment' by Jack L. Walker," *American Political Science Review* 67, 4 (December 1973): 1192-1193.

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Table 3: Diffusion Drivers and Influences

Driver	Military Influenced by:
Competition	Most successful models given geography and factor endowments
Spheres of influence	Bloc leader's models
Alliance obligations	Alliance leader's models
Economic pressures	Models that build on national industrial and commercial strengths
Technology/Commercialization	Models that confer competitive advantage in the civilian commercial economy
Bureaucratic survival	Models that support existing organizational preferences and/or offensive models
Socialization	Most accessible and familiar models
Legitimacy	Most legitimate models as defined by domestic elites and societies

Diffusion Enablers and Inhibitors

The next step in understanding specific state responses to the emergence of new ways of war is to assess whether the adopting state can readily absorb the new military technologies and implement the accompanying practices. How much of a threat or challenge a particular modernizing military represents depends in large part on its capacity to assimilate new technologies, ideas and practices and implement new ways of war. Scholars have noted that "a remarkable range of military hardware is available on the international market, [but] surprisingly few states have converted the technology available to them into a viable instrument of national power."[22] A growing body of empirical research identifies relevant factors that facilitate or inhibit assimilation and implementation. A reduced capacity to assimilate can hinder transformation, even when the level of motivation is high. Different factors will operate in any particular case although we should be able to generalize about each factor's impact.

Diffusion enablers and inhibitors comprise qualities of the innovation and qualities of the adopter. With reference to the qualities of the innovation, previous research on the diffusion of military innovations supports the view that hardware may be easily acquired but the accompanying software (e.g., doctrine, tactics, organizational form, and macro-social change) is far more difficult to develop and implement.[23] Today more than ever

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[22] Eric Arnett, "Beyond Threat Perceptions: Assessing Military Capacity and Reducing the Risk of War in Southern Asia," in Eric Arnett, ed., *Military Capacity and the Risk of War: China, India, Pakistan and Iran* (New York: Oxford University Press, 1997), 2.

[23] Goldman and Eliason, eds., op. cit.

before, leading edge technologies including the most advanced computers do not pose the same limits on capabilities and resources that precluded states from modernizing their militaries in the past. Nonetheless, the ability to acquire, develop or adapt the "software" necessary to take advantage of a new technology may be the more crucial factor in assessing the true capacity of a state's military. As specific cases studies have shown, the British, Soviet and American armies all possessed tanks, yet each had difficulty developing the doctrine and organization to wage combined-arms armored warfare.[24] The Soviet Union's Arab allies imported their weapons, but had great difficulty assimilating Soviet doctrine because they lacked the necessary skills of flexibility and adaptability. In their study of the spread of Soviet doctrine and organizational forms to Egypt, Syria, and Iraq during the Cold War, Eisenstadt and Pollack found no correlation between a reliance on Soviet equipment and the degree to which an Arab ally adopted Soviet organizational forms, concepts and practices.[25]

The acquisition of new technology is only the first and often the easiest step, but the successful importation or development of the tactics and administrative and training apparatus that make the military practice effective is a necessary and *usually* harder step. We stress the word *usually* because one case study of the US and its Anglo-Saxon allies demonstrated that software diffused more easily than hardware. Regular dialogue among the Americans, British, Canadians and Australians produced doctrinal and procedural standardization, while contemporary defense procurement's linkages to domestic economic concerns complicated the diffusion of hardware. Equipment standardization is a highly sensitive issue because it requires the purchase of foreign systems or domestic manufacture under license, both of which threaten indigenous defense industries.[26]

The literature on the attributes of adopting states that affects diffusion and transformation can be loosely grouped into four categories: the state's polity, economy, society and culture, and military.

Polity

The political environment includes an array of factors from state structure and power, to elite buy-in and commitment to reform, to the relationship between civilian and military authorities.

The importance of state structure has been identified by many scholars.[27] Limits on state power beyond gross national resources will affect the state's ability to respond to international pressures.[28] State strength limits what portion of national power governments can extract for their purposes. State strength includes capacity (e.g., the

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[24] Thomas G. Mahnken, "Beyond *Blitzkrieg*: Allied Responses to Combined-Arms Warfare during World War II," in Goldman and Eliason, eds., op. cit.

[25] Michael J. Eisenstadt and Kenneth M. Pollack, "Armies of Snow and Armies of Sand: The Impact of Soviet Military Doctrine on Arab Militaries," in Goldman and Elisaon, eds., op. cit.

[26] Thomas-Durrell Young, "Cooperative Diffusion through Cultural Similarity: The Post-War Anglo-Saxon Countries' Experience," in Goldman and Eliason, eds., op. cit.

[27] Stephen Krasner, *Defending the National Interest* (Princeton: Princeton University Press, 1979).

[28] Fareed Zakaria, *From Wealth to Power: The Unusual Origins of America's World Role* (Princeton: Princeton University Press, 1998): 35-41.

ability of the state to extract wealth); coherence (e.g., the extent of centralization or competition among key agencies and branches of government.); scope (e.g., how broadly the state defines its responsibilities); and autonomy (e.g., to what extent the state, rather than societal interests, articulate national goals.) [29] Hoyt surmises that states with strong state structures will compete successfully in RMAs because they will be able to acquire the necessary financial and human resources.[30]

More specifically, reformers must gain access to state authorities or be in a position to redirect investments into new warfare areas. Farrell's study of the adoption of British military practices by the Irish Army highlights the central role of reformers, or norm entrepreneurs, in mobilizing political support and implementing personnel changes.[31] Centralization of state authority is important for reform if central decision makers are committed to change. Foster and Goodman argue that the "Chinese government is by far the greatest enabler of change" in promoting internet diffusion "through its investments in the educational community … and its management of China Telecom."[32] In centralized state structures, penetration by reformers is difficult but, if successful, more likely to lead to policy change, whereas diffuse state structures may be easier to penetrate but change is more difficult because of the existence of more veto players.[33] Although a strong centralized state assists in implementation of military transformation by marshaling resources behind a project once a decision to transform is made, most theorists concur that centralized systems inhibit innovation.[34] In general, the ability of reformers to build coalitions and co-opt potential opponents, and the extent to which veto players exist who can derail reform, will affect the implementation of new ways of war. Often, networks developed between domestic and transnational actors play a vital role in transferring new ideas and ensuring they are internalized in domestic practices as the authors of a collection of essays on the spread of human rights practices show.[35] They also attribute variation in assimilation to domestic structures and processes, like societal openness.[36]

Domestic distributional issues may affect which practices are adopted. If change is perceived to be necessary, due to some sort of external shock such as defeat in war, reformers must construct a new endpoint and a coalition to support it. Avant argues that "the construction of a coalition around new ideas is most likely to occur when divergent

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[29] Zakaria (ibid), 38-9 ties state strength to capacity (e.g., the ability of the state to extract wealth); coherence (e.g., the extent of centralization or competition among key agencies and branches of government.); scope (e.g., how broadly the state defines its responsibilities); and autonomy (e.g., to what extent the state, rather than societal interests, articulate national goals.)

[30] Timothy D. Hoyt, "The Revolution in Military Affairs and the Developing World: What Can We Expect and Where?" paper submitted for the Annual Convention of the International Studies Association (April 17, 1996), 9.

[31] Theo Farrell, "Transnational Norms and Military Development: Constructing Ireland's Professional Army." *European Journal of International Relations* 7 (March 2001): 81.

[32] William Foster and Seymour E. Goodman, *The Diffusion of the Internet in China* (September 12, 2000): 78.

[33] Thomas Risse-Kappen, "Ideas Do Not Float Freely: Transnational Coalitions, Domestic Structures, and the End of the Cold War," *International Organization* 48:2 (Spring 1994):185-214.

[34] Matthew Evangelista, *Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies* (Ithaca: Cornell University Press, 1988): 29-33.

[35] Thomas Risse, Stephen C. Ropp, and Kathryn Sikkink. *The Power of Human Rights: International Norms and Domestic Change* (Cambridge: Cambridge University Press 1999).

[36] Thomas Risse and Stephen C. Ropp, "International Human Rights Norms and Domestic Change," in ibid., pp. 262-264.

interests or ideas are represented in the dominant coalition." [37] When the dominant coalition shares common ideas and interests and sees new ideas as a threat to those interests, old solutions will prevail. When dissent is present in the dominant coalition, reform is more likely, and the new solution will be the product of infighting among elites bent upon preserving their own interests. In his analysis of the railroad, rifle and telegraph Revolution, Showalter similarly argues that transformation is stimulated by controversy more than consensus in the military community.[38]

A state's legal and regulatory framework can affect transformation. Regimes that protect intellectual property rights are widely believed to enable innovation. Political norms, often rooted in culture and history, are widely posited to inhibit military transformation. The major example of this is Japan.[39] Article 9 of Japan's constitution renounces war as an instrument of policy and imposes severe constraints on Japan's security policy. Many Japanese equate Article 9 with democracy itself. Attempts to revise the constitution have failed repeatedly. Beyond these formal political constraints, reinforced by legal rulings in Japan, a series of tacit political understandings constrain the growth and activities of the Japanese military. Berger writes, "these taboos can be viewed as a sort of tacit social contract between the conservative government and a broader spectrum of society that exchanges toleration of the armed forces for promises to contain their growth and activities."[40]

The political role of armed forces also impacts their reactions to the emergence of new war fighting technologies and practices. Most scholars concur that external pressures and strategic threats drive concerns for competitiveness and superiority and stimulate the adoption of cutting edge military methods while internal security roles have the opposite effect.[41] In his assessment of the RMA in the Middle East, Eisenstadt argues that "one of the most important impediments to achieving an RMA … will be political. Nearly every military in the region has an internal security role, and each army has praetorian units organized primarily to counterbalance the regular military and prop up the regime. … [T]hese units get the best in equipment and training."[42] This observation has been made about past militaries. The military revolution associated with Prussian reforms in the 1860s coincided with a shift in the primary emphasis of European regular forces away from police functions to international war. The Ottomans were unable to emulate the short/active and long/reserve system associated with the Prussian model because they had

[37] Deborah Avant, "From Mercenary to Citizen Armies: Explaining Change in the Practice of War," *International Organization* 54, 1 (Winter 2000): 49.

[38] Dennis Showalter, "Information Capabilities and Military Revolutions the 19th Century Experience," paper prepared for the CSBA Workshop on "Military Revolutions: The Role of Information Capabilities," March 4-5, 2002, Washington, DC.

[39] Arthur J. Alexander, "Japan's Potential Role in a Military-Technical Revolution," report prepared for the Office of the Secretary of Defense (Net Assessment), January 13, 1995; Peter J. Katzenstein and Nobuo Okawara, "Japan's National Security," *International Security* (Spring 1993); Katzenstein 1996 op. cit.

[40] Thomas U. Berger , *America's Reluctant Allies: The Genesis of the Political-Military Cultures of Japan and West Germany*. PhD Dissertation, Massachusetts Institute of Technology, 1992, 489.

[41] Timothy D. Hoyt, "The Revolution in Military Affairs and the Developing World: What Can We Expect and Where?" paper submitted for the Annual Convention of the International Studies Association (April 17, 1996), 9.

[42] Michael J. Eisenstadt, "The Future Middle Eastern Threat Environment and the Revolution in Military Affairs (RMA)", 3.

to use regular forces for police duties to manage their substantial internal security problems.[43]

Biddle and Zirkle argue that the possibility of political instability and violence promotes civilian intervention in military affairs, and this reduces the military's ability to effectively use advanced technology.[44] The threat of military violence within regimes produces pathological civil-military relations where civilians attempt to control the military with the following types of measures: rotating commanders and purging the officer corps; suppressing horizontal communications within the military hierarchy; dividing lines of command; isolating officers from foreign sources of expertise or training; exploiting ethnic divisions in officer selection or combat unit organization; surveilling military personnel; promoting based on political loyalty rather than military ability; and executing suspected dissident officers. Collectively these undermine morale, and incentives and opportunities to accumulate experience and learn from abroad. The repression imposed on the military in coup-threatened regimes inhibits officers' exposure to foreign training; undermines officer's incentives to be concerned with performance because promotion is politically-oriented, not performance-oriented; undermines integration and rapid responsiveness because command lines are multiple and not clear and integrated; and inhibits the accumulation of knowledge and know-how due to rapid rotation, promotion, frequent purges, and suppression of horizontal communications within the military hierarchy. "Where the threat of political violence is low, civil authorities can afford to relax such draconian control measures and in the process make possible a much more effective use of technology by the military."[45]

Table 4 summarizes the political factors hypothesized to affect assimilation and implementation.

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[43] For example, 30,000 men were needed to retain order in Istanbul alone. M.E. Yapp, "The Modernization of Middle Eastern Armies in the Nineteenth Century: A Comparative View," in V.J. Parry and M.E. Yapp, eds., *War, Technology and Society in the Middle East* (London: Oxford University Press, 1975), 348-9.
[44] Stephen Biddle and Robert Zirkle, "Technology, Civil-Military Relations and Warfare in Southern Asia," in Eric Arnett, ed., *Military Capacity and the Risk of War: China, India, Pakistan and Iran* (New York: Oxford University Press, 1997), 317-345.
[45] Ibid, 320

Table 4: Political Factors Affecting Assimilation and Implementation

Factor	Enabler	Constraint
State structure (a)	Centralized, strong	Diffuse, weak
Political diversity (b)	Diverse interests in dominant coalition; Controversy in military organization	Consensus in dominant coalition; Consensus in military organization
Legal and regulatory framework (c)	Protection of intellectual property rights	Constitutional and legal prohibitions on military activity
Security focus of armed forces (d)	External security focus drives quest for competitiveness and superiority	Internal security focus diverts best troops and resources to prop up regime
Civil-military relations (e)	Professional autonomous military	Politicized military with civilian intervention

(a) Risse-Kappen (1994); Hoyt (1996); Zakaria (1998)
(b) Avant (2000); Showalter (2002)
(c) Berger (1992)
(d) Eisenstadt; Hoyt (1996)
(e) Biddle and Zirkle (1997)

Economy

Economic factors are of three basic types: economic growth; industrial and technological capabilities; and defense spending. Economic growth is often linked to a state's long-term potential to enhance its military power. Defense spending may capture commitment to reform to some extent, but statistics on defense spending for some of the countries examined here, particularly China, are notoriously unreliable. Defense expenditures also have more of an impact on the pace of military reform than on the substantive dimensions of reform. A large defense budget can often cover near and long-term goals, hastening the pace at which reform can occur. However, the shape of defense investments is as important for transformation as their magnitude. Krepinevich points out that a comparison of French and German military expenditures during the interwar years shows France enjoying a clear lead for nearly the entire period. Yet it was Germany that transformed its military to execute the *blitzkrieg* form of war and defeat France. In the same period, US and Japanese Navy budgets were constrained, in the former case by the Great Depression and in the later case by bureaucratic subservience to the Japanese Army. Nevertheless, both transformed their battle-fleets and made the aircraft carrier the central offensive strike element.

For our purposes, the most important economic dimension is the state's defense technological and industrial base, both its current capabilities and its ability to improve those capabilities. Technological capabilities can be improved through internal or

external means. Internal means require the development of indigenous defense industries, based on local talent, expertise, and research and development (R&D). Taiwan, for example, stresses "self-reliant defense" in order to "reduce its dependency upon foreign suppliers."[46] China similarly desires a high degree of self-sufficiency in defense acquisition. Successful indigenous development seems to require protection of intellectual property rights.

External sources of advanced technology include direct transfers of military technology from abroad, purchases of advanced components and equipment from world commercial markets, and technology diffusion from the state's civilian industries. Buying off the shelf allows a state to obtain sophisticated equipment quickly, but the risk is always that arms sales can be suspended. China is a state that has achieved a high degree of self-reliance in arms production, "one of the developing world's few producers of a full range of military systems."[47] But its current military technology is based on 1950s-era Soviet technology, so China will probably try to exploit external sources of technology. Cliff argues that given limitations imposed by foreign governments on military transfers to China from abroad and purchases on world markets "in contrast to the openness of China's civilian industry to foreign technology and investment - the third source could, in the long run, be the most promising source of knowledge and capability for China's defense industry."[48] Accordingly, the level of commercial technological capacity would be an indicator of military technological capacity. A survey of eight major civilian industries with the potential for supporting military technology development – microelectronics, computers, telecommunications equipment, nuclear power, biotechnology, chemicals, aviation and space – shows China's continued dependence on imports and overall technological deficiencies in many areas.[49] In general, it seems that too much self-reliance and too much dependence on transfers from abroad inhibits transformation. The ability to exploit emerging technologies requires both integration into the global economy and a vibrant indigenous technological capacity.

Another economic argument concerns the size of a nation's information industry, which, it has been argued, is a key aspect of a state's development into an information society that in turn is necessary for its military to transition from an industrial to an informational one.[50] Information, so the argument goes, has become a major factor underlying a nation's power, in addition to land, population and resources. The argument resembles that made by the Tofflers – the way a society makes war reflects the way it makes wealth, "not in technological terms alone, but in organization, communication, logistics, administration, reward structures, leadership styles and cultural assumptions."[51] They contend a society must permit the free-flow of information to take advantage of the current RMA. Students of innovation similarly have argued that high

[46] Richard A. Bitzinger and Bates Gill, *Gearing Up For High-Tech Warfare? Chinese and Taiwanese Defense Modernization and Implications For Military Confrontation Across the Taiwan Strait, 1995-2005* (Center for Strategic and Budgetary Assessments, February 1996), 33-34.
[47] Ibid, 16.
[48] Roger Cliff, *The Military Potential of China's Commercial Technology* (RAND, 2001), ix.
[49] Ibid.
[50] Major General Wang Baocun, "China and the Revolution in Military Affairs (1)," *China Military Science* 4 (2001), 148.
[51] Alvin and Heidi Toffler, *War and Anti-War* (New York: Warner, 1993): 37, 72.

"interconnectedness" – or "the degree to which the units in a social system are linked to disseminate new ideas rapidly among its members," positively correlates with innovativeness.[52]

Indicators used to assess the size of a nation's information industry include business volume of telecommunication services; capacity of public switchboards; telephone services; length of optical cable; digital microwave and satellite communication systems; percentage of population that possesses personal computers; and flows of information based on extensiveness of information networks and internet diffusion.[53] Taiwan, for example, has a growing commercial high-tech sector in electronics and information technology and a highly educated workforce, all of which, analysts argue, indirectly aids its defense industrial base.[54] This argument resembles "human capital" theories, discussed below, which assume that high levels of "wiredness" of a society will enable military transformation today.

Economic arguments about technological capacity often do not distinguish between two facets of technology: "hardware" and "software." Hardware refers to the artifacts or *techne* involved, while software is used to describe the organizational or human application component of an innovation or technology. New inventions can be put to use in various ways and often lead to changes in human behavior as their advantages become clear through use. This vital distinction points to the fundamental issue of the organizational, cultural and societal basis for the introduction, application, and institutionalization of new technologies and practices.

In their analysis of China's capacity to adapt and exploit the current RMA, Gill and Henley discuss the organizational structure, methods, and underlying incentives of China's industrial production.[55] China suffers from low interconnectedness, high formalism, and low organizational slack. China's military and commercial sectors are segregated, which inhibits cross-fertilization and diffusion of commercial technologies and organizational principles to the defense sector and the ability of the military to benefit from spin-on of locally available commercial technology. Bureaucratic formalism pervades organizational norms such that meeting production quotas is valued over innovation, even though formalization, "or the extent to which an organization imposes set rules and procedures for its members to follow," generally considered to impede innovation, also encourages implementation once a decision to innovate has been made."[56] Central planning reduces organizational slack and surplus capacity for producers to innovate outside the "plan." Chinese defense production also relies on "copy production" or reverse engineering, which is increasingly difficult with sophisticated digital technologies. Finally, the incentives in the production of dual use technologies are for lucrative commercial applications and markets, not spin-on efforts to support military modernization.[57]

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[52] Evangelista, op. cit. 43-45.
[53] Foster and Goodman, op. cit.
[54] Bitzinger and Gill, op. cit., 36.
[55] Bates Gill and Lonnie Henley, *China and the Revolution in Military Affairs* (Strategic Studies Institute, 1996):7-9.
[56] Evangelista, op. cit., 38-39.
[57] Bitzinger and Gill, op. cit., 20.

Table 5 summarizes the economic factors hypothesized to affect assimilation and implementation.

Table 5: Economic Factors Affecting Assimilation and Implementation

Factor	Enabler	Constraint
Economic growth	Strong	Weak
Defense spending	High	Low
Industrial and technology base (a)	Integration with global economy; Indigenous R&D; Strong information industry	Norm of self-reliance; Dependence upon imports and reverse engineering; Weak information industry
Interconnectedness (b)	Horizontal integration of defense and commercial sectors; Free flow of information	Segregated defense sector; High secrecy
Production incentives (c)	Spin-on focus	Commercial focus
Organizational slack (d)	Market economy	Planned economy
Technology transfers (e)	Low export controls on receiving state	High export controls on receiving state

(a) Gill and Henley (1996); Baocun (2001); Tofflers (1993); Bitzinger and Gill (1996); Foster and Goodman (2000)
(b) Gill and Henley (1996); Cliff (2001); Tofflers (1993)
(c) Gill and Henley (1996)
(d) Rogers (1983); Cyert and March (1963)
(e) Cliff (2001)

One clue in the search for explanations of the variation in responses to innovation lies in the fact that new technologies do not exist in a cultural or organizational vacuum. They are not neutral instruments utilized uniformly anywhere, anytime, by anyone. Many case studies of the diffusion of past military innovations demonstrate that military innovations requiring significant changes in socio-cultural values and behavioral patterns spread more slowly, less uniformly, and with more unpredictable outcomes. The rate of adoption may depend on how compatible the innovation is with existing values and practices as well as past experience and current needs of the adopting state, society or organization. Contemporary analyses support this assessment. Bitzinger and Gill argue that the existence of a huge military-industrial complex, a large military R&D infrastructure and an expanding commercial high-tech base is not enough for China to be able to exploit the

current RMA.[58]   They allude to a variety of historical, organizational, managerial, technical and political factors. The utilization aspect of diffusion–whether and how an innovation is integrated into an acquiring state's organizational structures–is of central importance to contemporary defense practitioners so we now turn to a discussion of social, cultural and organizational enablers and inhibitors.

<u>Society and Culture</u>

RMA scholars emphasize that transformation depends as much upon restructuring concepts and organizations as on developing or gaining access to the requisite technologies. Social and cultural factors are critical to these processes.

Rosen's analysis of the armies of India focuses on the impact of dominant social structures on the ability of the military to generate power.[59] High levels of internal social conflict and fragmented societies are mirrored within the military, even within contemporary professional militaries. The resulting absence of common loyalties reduces the military power that can be generated from a given amount of resources. Though Rosen is interested chiefly in explaining military capacity and not in transformation per se, his analysis suggests that highly divisive societies will have difficulty in generating military power even if they do have access to advanced technologies from abroad or from a vibrant indigenous commercial sector. High social conflict may reduce the ability of militaries to become more effective by absorbing new ideas and technologies. Social conflict in general appears to inhibit transformation, whether because the military reflects divisions in society and is therefore politicized in some sense as Rosen argues, or because social conflict thrusts the military into a political role, which then produces pathological civil-military relations that undermine the military's ability to exploit advanced technology as Biddle and Zirkle argue, or because internal conflict requires the military to assume a domestic policing role which prevents it from modernizing for external war, as Eisenstadt argues.

Human capital theory focuses on social characteristics such as literacy rates, the education level of the population and familiarity with machines and electronics, all of which purportedly affect a population's capacity to effectively master and utilize advanced technologies. Biddle and Zirkle claim that human capital theory has been used to argue that "Third World states…are at a systemic disadvantage relative to the developed countries in using sophisticated weapons effectively."[60] Demchak posits the importance of wider societal receptivity to networked computers for absorbing the current RMA.[61] She argues that implementing the current RMA "requires appropriate social infrastructure." … "Wider societal familiarity with networked computers is key to the organization's receptivity in terms of members' knowledge bases which reduces

[58] Ibid, 21.

[59] Stephen Peter Rosen, *Societies and Military Power: India and its Armies* (Ithaca: Cornell University Press, 1996).

[60] Biddle and Zirkle, op. cit., 317-318

[61] Chris C. Demchak, "RMA in Developing States: Botswana, Chile and Thailand," manuscript prepared for National Security Studies Quarterly Conference "Buck Rogers or Rock Throwers? Technology Diffusion, International Military Modernization, and the International Response to the Revolution in Military Affairs," October 14, 1999.

training costs, enhances the likelihood of innovation and lowers the scarcity wage that has to be paid to compete with the wider society for such skills. Greater familiarity is also critical to the lower prices for key hardware and application elements of the networked military systems."[62]

Demchak assesses societal receptivity by looking at internet users, investment in telecommunications systems, and the level of technical education in the population at large. Other measures of human capital have included literacy rates, the percentage of the population engaged in industrial production, and gross familiarity of the population with machines, as exemplified by the rate of car ownership. Human capital arguments are not uncontested. Biddle and Zirkle conclude that human capital is relatively unimportant relative to culture and civil-military relations. Cliff, in his discussion of China's human capital base as measured by formal education statistics, concludes that "absolute numbers of scientists and engineers may be more important than numbers as a proportion of total population, and in this regard China compares more favorably with other countries."[63] Arnett concurs that the human capital of the entire population is probably not relevant. The important factor is whether the society can sustain a high tech sector and whether scientists and engineers are effectively recruited from it into the military. Saxenian makes a similar argument when she examines the phenomenal economic success of Silicon Valley. A tremendous regional advantage was created despite factors operating in the society at large.[64]

Westney assesses social capacity in terms of the "organizational set" that supports the innovation. She argues that diffusion always produces adaptive responses because the new environment will probably lack some of the organizations that supported the model in its original setting. "Since the environment in which the organizational model was anchored in its original setting will inevitably differ from one to which it is transplanted, even the most assiduous emulation will result in alterations of the original patterns to adjust them to their new context, and changes in the environment to make it a more favorable setting for the emerging organization."[65] As a result, assimilation of new technologies and practices may be problematic if the necessary supporting organizations, such as schools or industries, are inadequately developed.[66]

Cultural factors (e.g., shared values about how society should be structured and function, and about the purpose and limits of armed violence) are widely cited in the literature as critical to diffusion. Young argues that diffusion is facilitated when nations share common values and language, presumably because this facilitates the transmission of ideas. Hall and Ikenberry note that common cultural heritage of the European states may explain the ease of diffusion of policy innovations among them.[67] Eisenstadt and Pollack conclude from their study of Arab militaries that a society's culture helps determine which skills and behavioral predilections the nation's manpower will bring to military

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[62] Ibid, 21.
[63] Cliff, op. cit., xii.
[64] Annalee Saxenian, Regional *Advantage: Culture and Competition in Silicon Valley and Route 128*
[65] Westney, op. cit., 6.
[66] Ibid, 28-31.
[67] John A. Hall and G. John Ikenberry, *The State* (Milton Keynes, UK: Open University Press, 1989).

service. Arnett believes that cultural constraints may be the "dominant inhibiting factors" that affect the "design, production and maintenance of weapon systems as much as they do operations."[68]

Little research examines specifically how culture affects the adoption of military technology and practices. Diffusion scholars tend to argue that because imported practices must be integrated into the indigenous culture, greater compatibility between the innovation and the existing cultural system as a whole will ease adoption and implementation. Compatibility captures the degree to which an idea/practice is perceived as being consistent with the existing values. A military organization may acquire a new technology, but face obstacles to developing the organizational structure or doctrine needed to realize its potential on the battlefield because the new practice conflicts with valued local patterns.

In his study of the spread of ideas, Checkel focuses on preexisting domestic understandings and argues the impact of new ideas will be greater if they resonate with domestic norms, understandings and beliefs, if, in his words, there is a "cultural match."[69] Diffusion should be more rapid when a cultural match exists, or as Risse and Ropp describe this "resonance proposition," when international norms "resonate or fit with existing collective understandings embedded in domestic institutions and political cultures."[70] In makes intuitive sense that new ideas must be compatible with worldviews embedded in political culture or held by elites powerful enough to build winning coalitions.[71] Nonetheless, for the cultural match argument to be compelling, scholars must specify the mechanisms by which culture produces its affect.

Goldman tackles this task in her analysis of the diffusion and assimilation of Western military practices to Ottoman Turkey and Meiji Japan in the nineteenth century.[72] She argues that culture shapes identity and so constrains the range of acceptable policy goals. Culture also provides a "tool kit" of resources from which reformers can construct new strategies of action.[73] She traces the impact of culture across three stages of the diffusion process. In the transmission stage, culture influences the extent of cross-fertilization between the carriers of new ideas and domestic actors. In the adoption stage, culture influences how extensively and faithfully elites attempt to emulate models from abroad. In the assimilation stage, culture shapes strategies of reform. Skilled users of culture draw upon the existing culture to construct new strategies of action that improve military effectiveness yet do not threaten higher order values. She identifies the relevant values underlying European military reforms – secularism, nationalism, rationalism and

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[68] Arnett, op. cit., 1997.
[69] Jeffrey T. Checkel, "Norms, Institutions and National Identity in Contemporary Europe." *International Studies Quarterly* 43 (1999):83-114.
[70] Risse and Ropp, op. cit., p. 271.
[71] Risse-Kappen, op. cit.
[72] Emily O. Goldman, "New Ways of War," manuscript.
[73] Ann Swidler, "Culture in Action: Symbols and Strategies," *American Sociological Review* 51:2 (April 1986):273-286. Swidler argues that culture only operates as a tool kit and does not define the ends of action. I disagree. While one cannot predict a specific set of goals from a particular culture, but culture certainly constrains the range of goals deemed acceptable.

professionalism – and assesses how well they resonated with Ottoman and Japanese culture.

Culture is a slippery concept and must be used carefully. This is best demonstrated by comparing current studies of China's propensity to exploit the current RMA with what we know about Japan's ability to exploit the unfolding RMA of the late nineteenth and early twentieth centuries. In their study of contemporary China, Gill and Henley make several arguments about the impact of China's norms and values on its approach to the RMA.[74] They argue that two concepts - Confucianism and *Tiyong* – underpin Chinese socio-cultural norms and continue to shape the way contemporary Chinese leaders and people view the world.

Traditional Confucian thought is the cultural baseline for China. It legitimizes conservatism, a strict social hierarchy, and maintaining the status quo. Everyone has a specific role in society and the role of the individual is subservient to the collective good. Any sort of innovation or technical revolution will disrupt the community. The cultural conservatism of Confucianism is therefore extremely resistant to social change, technical innovation and foreign ideas. Many of these traditional Confucian elements have continued into the communist era.

Tiyong is a concept derived from a modern Chinese idiom, *zhongxue weiti, xixue weiyong*, which means "Chinese learning for substance, Western learning for practical use." For Gill and Henley, this idiom represents the Chinese view "which understands China as an inherently higher culture and civilization, reluctant to accept and integrate the ideas and learning of foreigners, particularly those from the West." The Chinese, they argue, have a general suspicion of foreign ideas, allowing only a piecemeal acceptance of foreign things that will not undermine the Chinese essence. Similar views were held by most Ottomans in the eighteenth and nineteenth centuries, that emulation must be selective and confined to *techne* in order to prevent infiltration of Western ideas into social institutions.[75] This cultural factor is purported to explain China's quest for self-reliance, desire to establish an indigenous and independent capacity to produce modern hardware, and its resistance to the globalization of arms production. In conclusion, Gill and Henley argue that the greatest obstacles for China exploiting the emergent RMA do not rest in the development of technology so much as in the restructuring of concepts and organizations to support innovation, integration, flexibility and adaptability.

It should be noted that there are other idioms that refer to "Western learning" and they imply that China *can* absorb foreign ideas. A more popular idiom among workers and cadres, which is used in daily language and found in contemporary Chinese and Chinese-English dictionaries, is *yangwei zhongyong* ("to adapt foreign thing for Chinese use"). The expanded definition is as follows: "China's guiding principles can adopt foreign culture, science, technology, etc… that is, adapt with an analytical and critical approach

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[74] Gill and Henley, op. cit., 18-22.
[75] Goldman, "New Ways of War," manuscript.

to absorb the good things from foreign countries and use them to serve China's socialist revolution and construction."[76]

Meiji Japan's dramatic emergence as a major military power provides interesting counterpoints to the case of China, particularly if we examine the cultural factors involved. The neo-Confucian philosophy that prevailed in official circles actually assisted transformation. Some versions of neo-Confucianism emphasized a hierarchical order of society based on an "inherent stratification of human nature,"[77] but other Confucian scholars championed a more rationalist approach to social order. Society was not a product of nature but something that could be improved upon by knowledge. Schools must create "men of talent" and this required knowledge, from whatever source. It was necessary to seek knowledge throughout the world, unencumbered by value judgments.[78] Even though Tokugawa Confucianism accepted an existing social order based on samurai class domination, secular and rationalist views also thrived.

The Japanese also had a concept of "Western practical learning" but it led them to believe that Japan must assimilate, not reject, scientific and technical studies in order to defend against the West.[79] Sakuma Shōzan, an influential precursor to the Meiji reformers, argued that "foreign learning is rational and Chinese learning is not."[80] To avoid the "shame" of China's fate, Japan must recognize that the West was well versed in "practical learning," study their military arts, and become a great military power. Shōzan wanted to integrate Eastern (Chinese) morality and Western technique, "moving away from the concept of defending a culture towards that of defending a country."[81]

Paradoxically from the Western perspective which champions the importance of the individual, Japanese group-oriented values assisted in transformation. After the Meiji Restoration, group cohesiveness was put into the service of nationalism.[82] The size of the group changed from the *han* (fief) to the state, and Japanese familism was mobilized to create the family-state idea. "The Japanese traditions of ancestor worship and subordination of branch families to the main family were integrated to achieve loyalty on a national scale. The imperial family was regarded as the main family of the entire Japanese people, and the nation was regarded as an extended family."[83] In fact, "The people's strong sense of unity as a nation made it possible for the Japanese to introduce Western technology freely, without any fear of losing their integrity as a people."[84]

A similar argument is made by Foster and Goodman. They argue there is a Chinese culture of entrepreneurship but it is one of family rather than individual

[76] I thank John Kennedy for bringing this to my attention.

[77] Eiko Ikegami, *The Taming of the Samurai: Honorific Individualism and the Making of Modern Japan* (Cambridge: Harvard University Press, 1995): 313.

[78] R. P. Dore, "The Legacy of Tokugawa Education," in Marius Jansen, ed., *Changing Japanese Attitudes Toward Modernization* (Princeton: Princeton University Press, 1965): 113.

[79] William G. Beasley, *The Rise of Modern Japan* (St. Martin's Press, 1990: 22-25.

[80] Ibid, 25.

[81] Ibid; Kosaka 1969, 20-27.

[82] Ishida 1983, 4-5.

[83] Ibid 5.

[84] Ibid 12.

entrepreneurship.[85] It has supported the explosion of commerce in Hong Kong and Taiwan and, they claim, has begun to thrive in China today. Interestingly, it has been led by returning Western-educated Chinese, who, one might surmise, are skilled users of culture much like the Meiji reformers.

Finally, traditional samurai values provided a resource for radical social change in Meiji Japan. The majority of Meiji leaders were broadly educated, patriotic samurai who came to see the link between their honor culture and social change. Honor called for political activism, even when it meant overthrowing the existing political order. Meiji leaders were skilled users of culture who cultivated traditional samurai values for purposes of social change.[86] Just as the medieval samurai understood that prosperity of his *ie* (or house) was tied to his master's *o-ie* (organization of master's house), Meiji leaders linked the prosperity of their *ie* to the success of the country.[87] Meiji Japan is an excellent example of how "traditional" values can serve as a resource for change. A nationalized culture of honor condoned the need to learn from the West and absorb Western military technologies and practices in order to build a wealthy country and a strong army.

The business literature also privileges the role of culture and uses the measurements developed by Hofstede.[88]   Based on survey research in sixty countries, Hofstede measured national cultural characteristics according to four dimensions: 1) power distance (short or long), which refers to the level of inequality between people in terms of their power relationship, especially in terms of the hierarchical boss-subordinate relationship; 2) uncertainty avoidance (high or low); 3) level of individualism (high or low); 4) masculinity (high or low). Hofstede briefly discusses the consequences of each of these cultural dimensions.[89] A culture characterized by short power distance tends to produce flatter organizational pyramids; a culture characterized by high uncertainty avoidance tends to have more written rules and micro-managers.

Hofstede's dimensions could be used to assess the impact of culture on transformation (See Table 6). If the IT-RMA military requires a greater degree of delegation of discretion from higher to lower levels command, a culture characterized by short power distance may be more desirable. Countries in which political elites try to control the spread of information technologies for fear that they will diffuse power away from central authorities can be said to have "control" cultures or a long power distance. To the extent that political elites attempt to control their nation's integration into the global information economy, the civilian technological development will suffer as will the ability of the state to benefit from technology transfers from abroad.[90] Eisenstadt makes such an argument when he writes that "regimes that have fought the dissemination of information technologies in the civilian sphere (note the banning of satellite dishes in Syria, Saudi Arabia, and Iran) are likely to regard with caution military information technologies that may have the effect of diffusing military power by providing senior

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85 Foster and Goodman, op. cit., 77.
86 Ikegami, op. cit., 323.
87 Ibid 363.
88 Geert Hofstede, *Culture's Consequences*, 2nd. Ed. (Beverly Hills: Sage Publications, 1994).
89 Ibid 107, 143.
90 Gill and Henley, op. cit.,7.

commanders a clearer picture of the status and disposition of not only the enemy's armed forces, but their own armed forces as well. As a result, they are likely to carefully control the dissemination of these technologies and use them in very different ways than the US will, in order to - first and foremost – reinforce the regime's control of the military."[91]

If a greater degree of integration between different military units (synergy or jointness) is required, a high level of individualism may be harmful. A low level of masculinity may be desirable to ensure greater participation of qualified women in order to enlarge the potential pool of recruitment for an IT-RMA military force whose task is becoming increasingly more intellectually demanding. Finally, a high level of uncertainty-avoidance which encourages micromanagement may not be desirable, given that speed (prompt response) in a rapidly changing war situation is a key concept in future warfare.

Table 6: Use of Hofstede's Variables to Assess Potential for Utilizing RMA

Variables	Desirable Value	Impact
Power Distance	*Short*	*Delegation of Discretion to Lower Level*
Uncertainty Avoidance	*Low*	*Prompt Responsiveness*
Individualism	*Low*	*Synergy or Jointness*
Masculinity	*Low*	*Expanded Recruitment Pool*

Table 7 summarizes the social and cultural factors hypothesized to affect assimilation and implementation.

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[91] Eisenstadt, *Future Middle Eastern Threat Environment*, 3.

Table 7: Social and Cultural Factors Affecting Assimilation and Implementation

Factor	Enabler	Constraint
Social structure (a)	Unified social structure or unifying ideology	High levels of internal social conflict
Human capital (b)	High level of technical education and literacy; Societal familiarity with, and use of, computers	Low level of technical education and literacy; Low societal familiarity with, and use of, computers
Organizational set (c)	Strong	Weak
Cultural resonance (d)	Strong resonance eases transmission and enhances desire for adoption	Weak resonance inhibits transmission and diminishes desire for adoption
Culture as tool kit (e)	Skilled cultural entrepreneurs	Cultural conservatives
National culture (f)	Participatory Short power distance Low uncertainty avoidance Low individualism Low masculinity	Control Long power distance High uncertainty avoidance High individualism High masculinity

(a) Rosen (1996)
(b) Demchak (1999)
(c) Westney (1987)
(d) Checkel (1999); Goldman (2002); Young (2002); Hall and Ikenberry (1989)
(e) Swidler (1986); Goldman (2002)
(f) Eisenstadt; Hofstede (1994)

Military

Military organizations have been studied as natural systems, rational systems and open systems. Each perspective makes different assumptions about the goals of organizations and their propensity for transformation. Each perspective provides insights into the factors that enable and constrain transformation.

The natural systems perspective stresses that militaries, like all organizations, are driven by the need to survive and protect their self-interests in an environment of scarce resources and internecine strife. This produces a tendency in organizations to be conservative and risk averse,[92] and to adopt only technologies and strategies that will

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[92] Graham T. Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (Boston: Little Brown, 1971), 78-94; Richard Cyert and James March, *A Behavioral Theory of the Firm* (Englewood Cliffs, NJ: Prentice-Hall, 1963);

defend and ideally enhance the organization's resources, autonomy (jurisdiction and independence), and organizational essence (the views on missions and capabilities held by the dominant group in the organization). Change tends to be incremental and adjustments consistent with existing tasks. Some scholars argue that military organizations have an institutional interest in adopting offensive technologies and strategies because these enhance the organization's resources and control over its actions.[93] Still, the desire to preserve existing roles and routines often will override this incentive, particularly when change involves great risk and when the technological environment is highly uncertain.

Historians and social scientists have long noted the conservative biases in military organizations.[94] Posen argues that organizations place a premium on predictability, stability, and certainty and these values are inimical to innovation. But students of weapons innovation have qualified this conclusion in an important way. "They maintain that innovations that pose no threat to organizational routines, strategies or essence are often readily adopted. It is only the new weapons that portend major organizational changes, reallocation of resources, the possibility of diminished organizational autonomy and so forth that meet resistance."[95]

It is logical to assume from the natural systems perspective that transformation, which necessarily entails a major restructuring of the military organization, will not be easy. Not only is inertia inherent in the functioning of a large organization; it is supported by dominant group interests in the organization that are well positioned to network in the policy environment to support their interests. In this respect, as Rosen argues, organizations are complex political communities and innovation is an ideological struggle over a new theory of victory. Implementation of an innovation requires "creating new career paths along which younger officers specializing in the new tasks could be promoted."[96] Rosen's analysis suggests that change is possible if the distribution of power within the organization is not highly skewed toward a particular branch with strong legacy system interests. The issue may be less that of organizational conservatism per se and more a distributional question of whether those groups that are conservative are also dominant in the organization's power structure. If the distribution of power in the organization is more balanced, then pockets of transformers are as likely to enable change as groups of traditionalists are to constrain change.[97]

Herbert Kaufman, *The Limits of Organizational Change* (University, AL: University of Alabama Press, 1971); James Q. Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It* (Basic Books, 1989).

[93] Jack Snyder, "Civil-Military Relations and the Cult of the Offensive, 1914 and 1984," *International Security* 9 (Summer 1984), 108-46; Stephen Van Evera, "The Cult of the Offensive and the Origins of the First World War," *International Security* 9 (Summer 1984), 58-107.
[94] Posen, op. cit.; Katzenbach 1958.
[95] Evangelista, op. cit., 11-12.
[96] Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991).76.
[97] This argument is similar to the domestic distributional argument made by Avant 2000 and discussed under political enablers earlier in this essay. See note 37.

The rational systems perspectives views military organizations as driven to improve the efficiency with which they pursue their primary goal of securing the state.[98] Military organizations respond to the dictates of strategic geography, technological developments, and enemy behavior in rational pursuit of their goals.[99]

The organizational learning model falls within the rational systems approach. It assumes the organization's basic motivating goal is to achieve an optimal result in the outside world and to do so, the organization's members re-evaluate beliefs about their tasks, and redefine tasks, skills, and procedures accordingly. Organizations learn from observations and interpretations of experience.[100] The conditions which promote learning include pressure from civilians or other military actors, which provide "the impetus, political incentive, and political opportunity for a significant reevaluation of assumptions"[101]; the existence of credible knowledge and experience that supports the innovation; and urgency or pressures from the international environment including geostrategic vulnerabilities. Urgency aids problem identification, increases the pressure on the organization to focus its strategic priorities, bring experience to bear on the strategic problem in question, augment it with new information, and reevaluate programs and tasks accordingly. Krepinevich makes this argument for why certain military organizations are more able to exploit the advantages of military revolutions than others: because of their ability to focus more precisely on specific contingencies and competitors.[102]

Demchak similarly argues that a learning or "cybernetic" organization is the most supportive for military transformation today. Cybernetic organizations are proactive; they learn and change in response to "sensors consciously designed to monitor stimuli from the external environment." [103] Cybernetic organizations can be much more innovative than "organic" organizations which evolve to enhance their own survival, as in the natural systems view, or "social" organizations, which are constrained by the deeply held beliefs of their members.

The rational systems perspective stresses that organizations will accept risk in order to achieve the most desirable result in the outside world, even when they understand that by doing so, they may sacrifice some of their autonomy and resources. Organizations can overcome inertia provided there is urgent pressure from the international environment, pressure from domestic actors and a robust experiential base to support innovation.

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[98] Samuel P. Huntington, *The Soldier and the State* (Cambridge: Harvard University Press, 1957.

[99] Rosen 1988 and 1991, Zisk 1993.

[100] Learning is an individual cognitive exercise. Organizations learn "only through the individuals who serve in those organizations, by encoding individually learned inferences from experience into organizational routines." Jack S. Levy, "Learning and Foreign Policy: Sweeping a Conceptual Minefield*," International Organization* 48:2 (Spring 1994): 287-288. Individual interpretations of experience depend upon the frames through which events are comprehended. An organization's interpretive frameworks tend to be resistant to experience. Barbara Levitt and James G. March, "Organizational Learning," *Annual Review of Sociology* 14 (1988): 324.

[101] George Breslauer, "Ideology and Learning in Soviet Third World Policy," *World Politics* 39 (April 1987), p. 443.

[102] See Andrew F. Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest* (Fall 1994), p. 39.

[103] Demchak 1999 op. cit., p. 13.

An open systems perspective stresses that military organizations are manifestations of powerful institutional rules (or beliefs, understandings and standards about the ways things ought to be) and myths that are binding on their members. If the beliefs are located in the organizations, they form its culture.[104] Beliefs also reside in the political system and since military norms are nested in higher order political norms, changes in political norms may produce changes in military norms, e.g., what is appropriate behavior. Similarly, military norms associated with a particular transformation may nest more or less easily within different political cultures. Farrell explains Gustavus Adolphus's adoption in the 1630s-40s of Holland's radical military reforms because "the Dutch military norm nested neatly in Swedish political culture."[105]

Social and cultural theories that underwrite the open systems view contend that militaries can change but change is shaped by beliefs collectively held by members of the organization. Those beliefs may be rooted either in recent experience[106] or deep historical practice. To assess an organization's potential for transformation, it is necessary to look at the way the organization identifies itself, the enemy, the nature of warfare, and the appropriate way to wage war.

The open systems view also emphasizes the ways that organizations constitute their environments. There is no natural logical development of technologies; rather particular technologies succeed because of the social networks that support them. Military change does not simply follow in the wake of new technologies, although it can if the new technology is promoted by scientists and powerful social networks. Rather, militaries may adopt new technologies "in order to undertake change made necessary by some cultural, strategic, or political development."[107] Sumida has argued in this respect that technology is not an independent cause but rather militaries choose particular technologies based on their beliefs about the nature of future war.

Table 8 summarizes the organizational factors hypothesized to affect assimilation and implementation.

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[104] Theo Farrell, "Figuring Out Fighting Organizations: The New Organizational Analysis in Strategic Studies," *The Journal of Strategic Studies* 19, 1 (March 1996), 124-125.
[105] Theo Farrell, "Wordl Culture and the Irish Army, 1922-1942," in Farrell and Terriff, eds., op. cit.
[106] Legro, op. cit.
[107] Farrell 2002 op. cit., p. 26.

Table 8: Military Factors Affecting IT-RMA Assimilation and Implementation

Factor	Enabler	Constraint
Existing organizational preferences (a)	Parity in power among service's branches	Asymmetry in power among service's branches skewed toward legacy systems
Domestic pressure (b)	High and multiple sources	Low
Experiential base (c)	Strong	Weak
International vulnerability (d)	High	Low
Organizational type (e)	Cybernetic; rational, learning system	Socio-political; military highly politicized
Organization's beliefs (f)	Meshes with innovation	Conflicts with innovation (e.g., ANZAC spirit)
Interconnectedness	High promotes jointness	Low feeds inter-service rivalry

(a) Allison (1971); Cyert and March (1963)
(b) Posen (1984); Haas (1991); Goldman (1999)
(c) Haas (1991); March and Olson (1988); Goldman (1999)
(d) Krepinevich (1994); Goldman (1999); Haas (1991)
(e) Demchak (1999)
(f) Eden (2002 or 03); Farrell (1996); Legro (1995)

Summary and Conclusions

The extent to which the United States will be able to enjoy its military lead depends to a large extent on whether and how others assimilate and exploit the innovations associated with the IT-RMA. Understanding diffusion and the dynamics of transformation abroad is essential to US policy choice, even if not sufficient without answers to questions about technical feasibility, the likelihood that military superiority can be translated into political influence, or the appropriateness of an IT-based military to the security challenges of the future.

The spread of revolutionary military innovations across the international system raises a series of questions that must be answered if we are to understand how the IT-RMA is likely to spread and transform militaries worldwide.

1) When do states attempt to adopt RMA innovations and transform their militaries? Always, only when severely threatened or when exposed to a highly salient demonstration, or not always even then?
2) Are most attempts at transformation, once decided upon, carried through to completion, or are they often blocked from full implementation? When and why?

3) When transformation occurs, is it faithful to any particular imported model? Is the result a hybrid quite different from either the source's or the state's own prior practice? Or, is only a surface impression created while essentials of the prior practice are retained? If results vary, when and why?

4) What are the barriers to transformation which explain the answers to these questions? Which barriers are stronger and which are weaker? To what extent do states have the ability to overwhelm these barriers, and what determines when they do overwhelm them?

The states examined in this study each have an incentive to transform although as the case studies demonstrate, each country is pursuing a partly unique trajectory that diverges from the others and from the US path. Unique trajectories seem to be based on different diffusion drivers and different strategic circumstances. For example, the Japanese are focusing chiefly on defensive capabilities and on improving interoperability with the United States. China, like the United States, is interested is offensive IW, but is also pursuing avenues the US is not, such as precision-guided conventional ballistic missiles and area denial capabilities.

Answering questions two and three above requires us first to answer question four. In other words, whether or not a state transforms deeply and how much the transformed military diverges from its predecessor depends upon the barriers to, and conversely enablers of, transformation. The capacity to assimilate new technologies, doctrines and behavioral practices is one of the most important dimensions of the diffusion equation that will affect the scope and pace of transformation. Some scholars assume that with sufficient motivation and strategic necessity, any obstacle can be surmounted. Others skirt the capacity issue by assuming an evolutionary logic, namely that militaries must adapt and if they do not they will eventually face defeat. This is an equally unsatisfying answer because it tells us little about which states will adapt and which will not.

Capacity has political, economic, social/cultural and military dimensions. Each of these arenas plays a role in fostering innovation in the public and private sectors, and in facilitating the flow of ideas across borders, sectors, organizations, and services. Figure 1 distills from the preceding discussion a set of key factors that enable transformation. Some factors are situational, like international vulnerability; others reflect policy choices, such as intellectual property rights protection. Situational factors are more difficult to change; policy choices, since they reflect the government's commitment to a certain policy direction, are more malleable and amenable to influence. Scoring any particular country across these factors will provide an overall assessment of their "receptivity" to transformation.

Figure 1: Key Factors Enabling Adoption and Implementation of the IT-RMA

Government
Strong state
External security focus
Intellectual property
rights protection
Political diversity in
ruling coalition

Military
Professional military
Cybernetic
organization
Robust experiential
base
Interconnectedness

Social and Cultural
Low social conflict
Societal familiarity
with computers
Participatory culture
Skilled cultural
entrepreneurs

Adoption and Implementation of IT-RMA

International
Alliances with West
Transnational
linkages
International
vulnerabilities

Economy
Market-based
High defense spending
Strong info. industry
Indigenous R&D
Globally integrated
Sectoral
interconnectedness
Low export controls on state